

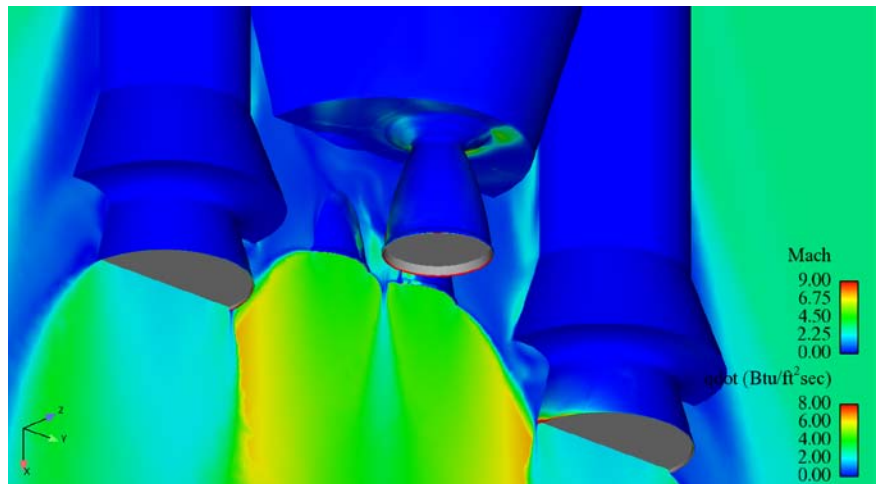
Information for TFAWS Center Status Poster

- Center - Marshall Space Flight Center/Michoud Assembly Facility
- POC Name - Callie McKelvey
- POC Email - callie.s.mckelvey@nasa.gov
- Center Overview
 - Center director - Robert Lightfoot
 - Aerial view of center? - See attached MS PowerPoint document
 - Overview of center history – when established, primary roles for overall NASA?
 - Since its beginning in 1960, Marshall has provided the agency with mission-critical design, development and integration of the launch and space systems required for space operations, exploration, and scientific missions. Dr. Von Braun became the director of MSFC on July 1, 1960. NASA acquired Michoud in 1961 for assembly of large space vehicles and assigned the management of the site to Marshall.



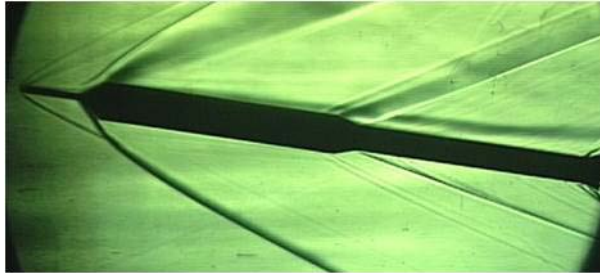
- Primary roles for NASA - Heavy Lift and Propulsion Systems, Command Post of science on ISS, Earth Science missions
- Center staffing numbers – civil servants and contractors
 - Marshall - 6,000+ employees
 - 2,520 Civil Servants
 - 3,400+ Contractors

- Michoud - 600 employees
 - 50 Civil Servants
 - 550 Contractors
 - Capabilities
 - Analysis Capabilities
 - Major analysis tools
 - Thermal Modeling Tools
 - Thermal Desktop
 - SINDA/G (Systems Improved Numerical Differencing Analyzer/Gaski)
 - SINDA/FLUINT (SINDA/Fluid Integrator)
 - FEMAP
 - MSC.PATRAN/MSC.SINDA
 - Fluid/Aerothermal Modeling Tools
 - GFSSP (Generalized Fluid System Simulation Program) ((In-House)
 - Loci-CHEM (CFD Density Based Code)/Loci-STREAM (CFD Pressure Based Code)
 - ARTIF (CEC,RAMP2, SPF/3, VNAP2, BLIMPJ, MOC, Source Flow, GASRAD, RMC, PLIMP/LSC)
 - MINIVER II, CLVMIN, USREMIN
 - STATE, CLVSTATE (Statistical Entry Code)
 - COMSOL (Common Solution Multiphysics Software)

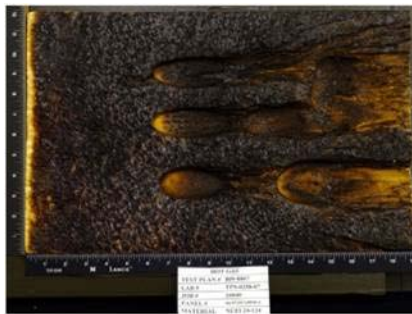


- Thermal Desktop/Boundary Condition Mapper
 - Facility Capabilities
 - Major test facilities
 - Environmental Test Facility
 - 27 chambers (Thermal Vacuum, Launch Simulation, Thermal Humidity, Thermal Altitude)
 - Largest chamber is 20 ft dia, 28 ft long

- Smallest chamber is 2 ft dia, 2.5 ft long
- Facility averages over 200 tests per year
- Experimental Fluids Test Facility
 - Aerodynamics Research Facility
 - Nozzle Test Facility
 - Turbine Test Facility
 - Pump Test Facility
 - Solid Rocket Motor Facility
 - Injector Test Rig



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- Hot Gas Facility
 - Used for TPS testing and aerothermal definition

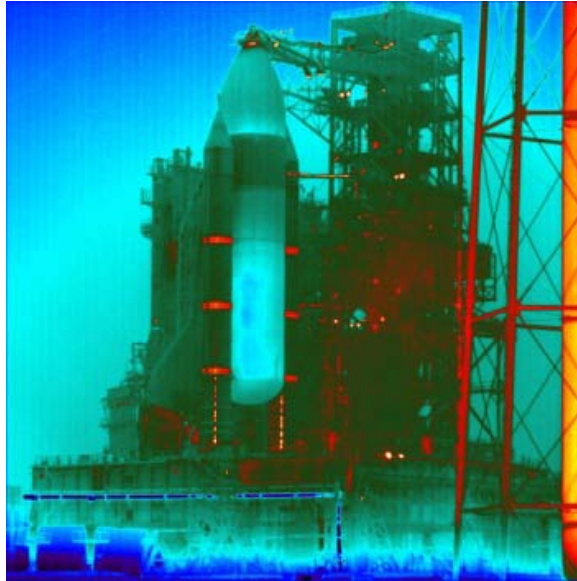


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- X-Ray Cryogenic Facility
 - Chamber with large helium cooled enclosure



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- Unique capabilities
 - Infrared Calibration Facility

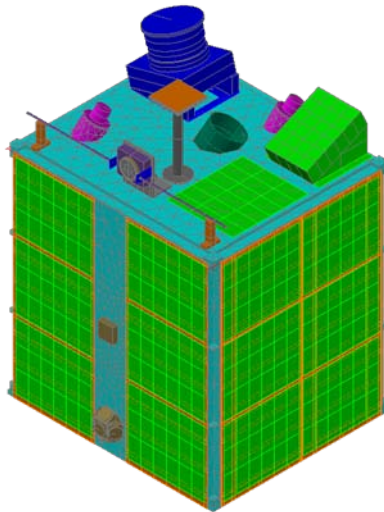
- Infrared Thermography



- Staffing
 - Thermal & Fluids Manpower (CS & Contractor)
 - Engineering Programs & Systems Office
 - 2 thermal engineers
 - Propulsion Systems Department (ER)
 - 18 thermal engineers, 121 fluids analysts
 - Space Systems Department (ES)
 - 7 thermal engineers
 - Spacecraft & Vehicle Systems Department (EV)
 - 21 thermal engineers, 25 fluids analysts
- Current Challenges
 - Prediction/Correlation of Multi-Layer Insulation Blanket Performance During Venting
- Status
 - Constellation
 - TD04/TD05 Convection Testing
 - Ares I First Stage Development (5-Segment Solid Rocket Booster)



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- Space Launch System (Heavy Lift)
 - Requirements Analysis Cycle (RAC) & Design Analysis Cycle (DAC) Reviews
- FASTSAT-HSV01
 - Launched in November 2010
 - Operational Support & Post-Flight model correlation



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- Robotic Lunar Lander Development Project
 - Thermal design, analysis, testing and risk mitigation
 - Self-impingement heating
- STS SSME, External Tank and SRB
- ISS & Environmental Control & Life Support Systems
- Cryogenic Fluid Management
- Commercial Crew Development – 2
- Technology Investment Program Task: “Manufacture and Test of Subscale Composite Sandwich Cryotanks Utilizing Cross-Linked Aerogel Cryogenic Insulation”
- Nuclear Thermal (NTREES)
- Outlook
 - Effect of new NASA direction on capabilities, facilities & staff

- Difficulty in maintaining contractor workforce due to cancellation of Ares I Upper Stage and Vehicle Integration coincident with STS conclusion.
- Project/program change and/or cancellations
 - Center re-organization to include the following project offices:
 - Science & Technology Office
 - Flight Programs & Partnerships Office
 - Space Launch System Program Office
 - Shuttle-Ares Transition Office
 - Cancellation of Ares I and Ares V (as part of Constellation)
 - Formulation of the Space Launch System Program/Project